

CLAIMS

1. A system for deploying a bifurcated stent to a bifurcation site, the system comprising a catheter, the catheter being adapted for insertion into a body vessel, the catheter being advanced to the bifurcation site along a primary guide wire and a secondary guide wire, the catheter having a stent retaining region for retaining the bifurcated stent in an unexpanded state thereon, the catheter having a closed configuration and an open configuration, in the closed configuration a proximal housing and a distal housing overlie the stent retaining region, in the closed the proximal housing and the distal housing being immediately adjacent to one another to define a split region, in the open configuration the proximal housing and the distal housing being separated to enlarge the spit region and expose the stent retaining region, in the open configuration at least a portion of the bifurcated stent being released from the stent retaining region through the spit region to expand from the unexpanded state to an expanded state.

2. The system of claim 1 wherein the primary stent section is balloon expandable, self-expandable, or hybrid expandable.

3. The system of claim 1 wherein the stent retaining region comprises an expandable balloon.

4. The system of claim 1 wherein the bifurcated stent comprises a primary stent section and a secondary stent section, the at least a portion of the bifurcated stent being at least a portion of the primary stent section.

5. The system of claim 4 wherein the primary stent section having a first end and a second end the first end defining a proximal opening and the second end defining a distal opening, in the expanded configuration the primary stent section defining a primary flow path between the proximal opening and the distal opening.

6. The system of claim 5 wherein the primary stent section defines a secondary opening, an end of the secondary stent section being engaged to a portion of the primary stent section defining the secondary opening, the secondary stent section defining a secondary flow path, the secondary flow path being in fluid communication with the primary flow path through the secondary opening.

7. The system of claim 6 wherein the end of the secondary stent section is removeably engaged to the portion of the primary stent section defining the secondary opening.

8. The system of claim 6 wherein the secondary stent section and the primary stent section are integrally formed.

5 9. The system of claim 6 wherein in the expanded state the secondary stent section is positioned within a secondary vessel of the bifurcation site.

10. The system of claim 9 wherein the catheter further comprises a pusher mechanism, the pusher mechanism being engaged to the secondary guide wire, the pusher mechanism constructed and arranged to initiate expansion of the secondary stent section from the
10 unexpanded state to the expanded state.

11. The system of claim 10 wherein the pusher mechanism provides at least one stimulus to the secondary stent section in the unexpanded state, the at least one stimulus selected from the group consisting of: a predetermined electric stimulus, a predetermined mechanical stimulus, a predetermined chemical stimulus, a predetermined temperature stimulus and any
15 combination thereof.

12. The system of claim 9 wherein the secondary guide wire is constructed and arranged to guide the secondary stent section into the secondary vessel.

13. The system of claim 9 wherein the secondary stent section is expanded into the secondary vessel after the primary stent section is expanded to the expanded state.

20 14. The system of claim 2 wherein the secondary stent section is self-expandable.

15. The system of claim 1 wherein at least a portion of the bifurcated stent is constructed from a shape-memory material.

16. The system of claim 1 wherein at least a portion of the bifurcated stent is constructed from a metal selected from the group consisting of stainless steel, nitinol, Elgiloy, shape-memory material, and any combination thereof.
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17. The system of claim 1 wherein at least one of the proximal housing and the distal housing is selected from the group consisting of a retractable sleeve, retractable sheath, retractable sock or any combination thereof.

18. The system of claim 4 further comprising at least one radiopaque marker.
19. The system of claim 18 wherein the at least one radiopaque marker is positioned on the bifurcated stent.
20. The system of claim 19 wherein the at least one radiopaque marker is positioned on the bifurcated stent approximately at a junction of the primary stent section and secondary stent section.
- 5 21. The system of claim 19 wherein the at least one radiopaque marker is a portion of the bifurcated stent.
22. A stent delivery system comprising:
- 10 a catheter, the catheter being adapted for insertion into a body vessel and advancement to a bifurcation site along a primary guide wire and a secondary guide wire, the catheter having:
- 15 a primary angioplasty balloon and a secondary angioplasty balloon, the primary angioplasty balloon being advanced to the bifurcation site along the primary guide wire, the secondary angioplasty balloon being advanced to the bifurcation site along the secondary guide wire, the secondary guide wire guiding the secondary angioplasty balloon into a secondary vessel of the bifurcation site, the primary guide wire guiding the primary angioplasty balloon into a primary vessel of the bifurcation site, and a primary stent delivery balloon and a secondary stent delivery balloon, the primary stent delivery balloon
- 20 being advanced to the bifurcation site along the primary guide wire, the primary stent delivery balloon being positioned on the primary guide wire proximal to the primary angioplasty balloon, the secondary stent delivery balloon being advanced to the bifurcation site along the secondary guide wire, the secondary stent delivery balloon being positioned on the secondary guide wire proximal to the primary angioplasty balloon.
- 25 23. The system of claim 22 further comprising a bifurcated stent, the bifurcated stent being disposed about at least a portion of the primary balloon and secondary balloon, the bifurcated stent having an unexpanded configuration and being expandable to an expanded configuration, the bifurcated stent having a primary stent section and a secondary stent section, the primary stent section having a proximal region and a distal region, in the

unexpanded configuration the proximal region of the primary stent section being disposed about at least a portion of the primary balloon and the secondary balloon, in the unexpanded state the secondary stent portion is disposed about only the secondary balloon.

24. The system of claim 23 further comprising at least one radiopaque marker.

5 25. The system of claim 24 wherein the at least one radiopaque marker is positioned on the bifurcated stent.

26. The system of claim 25 wherein the at least one radiopaque marker is positioned on the bifurcated stent approximately at a junction of the primary stent section and secondary stent section.

10 27. The system of claim 25 wherein the at least one radiopaque marker is a portion of the bifurcated stent.

28. The system of claim 22 wherein at least a portion of the bifurcated stent is constructed from a shape-memory material.

15 29. The system of claim 22 wherein at least a portion of the bifurcated stent is constructed from a metal selected from the group consisting of stainless steel, nitinol, Elgiloy, shape-memory material, and any combination thereof.

20 30. The system of claim 23 further comprising an expansion resistant band, the band being disposed about at least a portion of the primary stent delivery balloon and at least a portion of the secondary stent delivery balloon, in the unexpanded state the proximal portion of the primary stent section being disposed about the band.

31. The system of claim 30 wherein the band is constructed from at least one material from the group consisting of PET, stainless steel.

32. A bifurcated stent comprising:

25 a first stent section, the first stent section being expandable from a predeployed state to a deployed state, in the deployed state the first stent section defining a primary flow path;

a second stent section, the second stent section being expandable from a predeployed state to a deployed state, in the deployed state the second stent section defining a secondary flow path, the secondary flow path in fluid communication with the primary

flow path, the first stent section the second stent section being expandable independently from one another; and

at least one linkage member, the at least one linkage member linking an end
5 of the secondary stent section to a portion of the first stent section, the at least one linkage member constructed and arranged to provide an articulated engagement between the first stent section and the second stent section.

33. The stent of claim of claim 32 wherein the articulated engagement between the first
10 stent section and the second stent section defining an angular range of about 10 degrees to about 120 degrees.

34. The stent of claim 32 wherein the at least one linkage member is constructed and
arranged to provide a bendable hinge between the first stent section and the second stent
section.

35. The stent of claim 32 wherein the at least one linkage member has a substantially
15 curvilinear shape.

36. The stent of claim 32 wherein the at least one linkage member is characterized as
being substantially S-shaped.

37. The stent of claim 32 wherein the at least one linkage member is constructed from
metal.

20 38. The stent of claim 32 wherein the at least one linkage member is constructed from a
shape memory metal.

39. The stent of claim 38 herein at least a portion of the at least one linkage member is
selectively annealed.

40. The stent of claim 32 wherein the at least one linkage member comprises at least four
25 linkage members.

41. The stent of claim 32 wherein the at least one linkage member comprises at least
eight linkage members.

42. A bifurcated stent expandable from an unexpanded state to an expanded state for
implantation at a bifurcation site, the stent comprising:

a first stent section, the first stent section being expandable from a predeployed state to a deployed state, in the deployed state the first stent section defining a primary flow path;

5 a second stent section, the second stent section being expandable from a predeployed state to a deployed state, in the deployed state the second stent section defining a secondary flow path, the secondary flow path in fluid communication with the primary flow path, the first stent section the second stent section being expandable independently from one another, in the deployed state the first stent section being deployed into a primary
10 vessel of the bifurcation site adjacent to the carina, in the deployed state the secondary stent section being deployed into a secondary vessel of the bifurcation site, in the deployed state the first stent section extending across the secondary vessel but not substantially beyond the carina of the bifurcation site.